

U.S. Department of Commerce
National Institute of Standards and Technology
(formerly National Bureau of Standards-NBS)

Commercial Standard CS261-63

Grading of Diamond Powder in Sub-Sieve Sizes

Commercial Standard CS261-63, Grading of Diamond Powder in Sub-Sieve Sizes, was revalidated as Product Standard PS62-74, Grading of Diamond Powder in Sub-Sieve Sizes.

Product Standard PS62-74 was withdrawn by the U.S. Department of Commerce on August 18, 1980.

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The following standard was used to replace PS62-74: ANSI B74.20-81, Grading of Diamond Powder in Sub-Sieve Sizes.

For additional information concerning the subject and related standards and/or copies, contact:

Unified Abrasives Manufacturers' Association (UAMA)
(Diamond Wheel Manufacturers Institute)
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Abrasive Engineering Society (AES)
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B74.20 Specifications for Grading of Diamond Powder in Sub-Sieve Sizes
B74.3, Specifications for shapes and sizes of diamond or Cbn abrasive products
B74.16, American National Standard for checking the size of diamond or cbn abrasive products

Many standards can be searched via ANSI at <http://www.ansi.org> (e-standards) or <http://www.nssn.org>

Commercial Standard **CS261-63**

Grading of Diamond Powder in Sub-Sieve Sizes

WITHDRAWN

A recorded
voluntary standard of the
trade published by
the U.S. Department
of Commerce



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U.S. DEPARTMENT OF COMMERCE

NATIONAL BUREAU OF STANDARDS

Office of Commodity Standards

EFFECTIVE DATE

Having been passed through the regular procedures of the Office of Commodity Standards (formerly the Commodity Standards Division, Office of Technical Services; transferred to the National Bureau of Standards July 1, 1963), and approved by the acceptors herein after listed, this Commercial Standard is issued by the U.S. Department of Commerce, effective September 20, 1963.

LUTHER H. HODGES, *Secretary*.

COMMERCIAL STANDARDS

Commercial Standards are developed by manufacturers, distributors, and users in cooperation with the Office of Commodity Standards of the National Bureau of Standards. Their purpose is to establish quality criteria, standard methods of test, rating, certification, and labeling of manufactured commodities, and to provide uniform bases for fair competition.

The adoption and use of a Commercial Standard is voluntary. However, when reference to a Commercial Standard is made in contracts, labels, invoices, or advertising literature, the provisions of the standard are enforceable through usual legal channels as a part of the sales contract.

Commercial Standards originate with the proponent industry. The sponsors may be manufacturers, distributors, or users of the specific product. One of these three elements of industry submits to the Office of Commodity Standards the necessary data to be used as the basis for developing a standard of practice. The office by means of assembled conferences or letter referenda, or both, assists the sponsor group in arriving at a tentative standard of practice and thereafter refers it to the other elements of the same industry for approval or for constructive criticism that will be helpful in making any necessary adjustments. The regular procedure of the office assures continuous servicing of each Commercial Standard through review and revision whenever, in the opinion of the industry, changing conditions warrant such action.

SIMPLIFIED PRACTICE RECOMMENDATIONS

Under a similar procedure the Office of Commodity Standards cooperates with industries in the establishment of Simplified Practice Recommendations. Their purpose is to eliminate avoidable waste through the establishment of standards of practice for sizes, dimensions, varieties, or other characteristics of specific products; to simplify packaging practices; and to establish simplified methods of performing specific tasks.

The initial printing of CS261-63 was made possible through the cooperation of the Industrial Diamond Association of America, Inc.

Grading of Diamond Powder in Sub-Sieve Sizes

[Effective September 20, 1963]

1. PURPOSE

1.1 The purpose of this Commercial Standard is to provide a nationally recognized standard for the sizing of diamond powder in sub-sieve (micron) sizes and a uniform method of determining conformance with the size designated. It serves as a common basis for understanding between purchasers and sellers as to the quality and particle size desired or supplied, and thereby should promote fair competition.

2. SCOPE

2.1 This Commercial Standard covers the quality requirements of sub-sieve sizes of diamond powder and establishes the standard particle size ranges for micron sizes. It establishes size designations of the size ranges and the grading limits that are acceptable in each size range. It also gives a method of inspection to determine compliance with this standard and directions for the labeling of powder to indicate such compliance.

2.1.1 This Commercial Standard does not cover in any way the quality requirements of diamond powder in sieve sizes which are contained in the latest edition of Commercial Standard CS123-49, Grading of Diamond Powder.

3. DEFINITIONS

3.1 The terminology used herein is defined for purposes of this standard as follows:

Micron sizes.—Those sizes of diamond powder usually prepared by methods of separation other than by sieving, mainly Stokesian, and usually smaller than the sieve sizes.

Particle size.—The particle size is equal to the diameter of a circle having the same area as the profile of the particle when viewed with a microscope.

Fines or undersize particles.—Fines (undersize particles) are any particles smaller than the minimum for any specified size.

Slivers.—A sliver is a particle of needle or rodlike shape such that the ratio of the major to the minor axes is greater than 3 to 1.

Shales.—A shale is a particle of thin platelike shape, which when viewed through a microscope using transmitted light, appears to be transparent.

4. REQUIREMENTS

4.1 General.—All diamond powder labeled or otherwise designated or represented as complying with this Commercial Standard, shall meet or exceed all of the requirements given herein.

4.2 Material.—The powder shall consist of crushed diamond, cleaned of impurities so as to satisfy paragraph 4.6.

4.3 Standard sizes.—The standard size ranges, size designations and size tolerances are given in table 1. Intermediate sizes may also be labeled as conforming to this standard if the powder complies in all other respects to this standard, and provided the exact size range and maximum oversize is clearly stated on the label or certificate as shown in par. 6.3.

TABLE 1. *Standard micron sizes of diamond powder*

Size designation ¹	Nominal particle size range	Maximum oversize particles	Tolerance
	<i>Microns</i>	<i>Microns</i>	
1/4	0 to 1.....	1 1/4	Particles smaller than the minimum for each size range shall not be present in an amount more than 30 percent by count.
1	0 to 2.....	3	
3	2 to 4.....	5	
6	4 to 8.....	10	
9	8 to 12.....	14	Particles larger than the largest size of the nominal particle size range shall be avoided. They shall, however, be permissible up to the maximum oversize shown, but limited to a maximum amount by count of 5 percent up to and including grade 9, 3 percent for grades 15 and 30 and 2 percent for coarser grades.
15	12 to 22.....	25	
30	22 to 36.....	40	
45	36 to 54.....	58	
60	54 to 80.....	85	

¹ The size designations have been determined by common usage and were originally the average size of the standard size ranges (see CS123-49).

4.4 Slivers.—The micron sizes shall not contain any slivers that are longer than twice the maximum oversize for any specified size range but may contain up to 3 percent by count of slivers that have lengths between the nominal maximum and twice the maximum oversize.

4.5 Shales.—The micron sizes shall contain not more than 10 percent by count of shales, disregarding fines.

4.6 Impurities.—A maximum of 2 percent by weight of impurities is permitted.

5. METHOD OF INSPECTION

5.1 Sampling.—A representative sample for chemical and microscopic examination may be obtained by thoroughly mixing the powder and carefully removing the desired amount with a micro-spatula.

5.2 Particle size determination.—A small dab of Canada balsam is placed on a clean glass slide and a representative sample of the diamond powder is carefully placed on top of it with a micro-spatula. Care should be taken to avoid excess balsam as segregation of sizes may occur if too much is squeezed out when the cover glass is applied. The slide is then gently heated and as the balsam softens and spreads

the powder is stirred into it. When the particles are evenly dispersed a cover glass is applied. When the slide has cooled it may be cleaned with an appropriate solvent. The slide is then placed under a microscope or projection microscope at a suitable magnification. (It is suggested that a magnification of at least 1000 power, using oil immersion techniques be used for standard size ranges $\frac{1}{2}$, 1, 3, 6, and 9; at least 400 power for standard size ranges 15 and 30; and at least 100 power for standard size ranges 45 and 60.) The size of a particle is determined by selecting a circle equivalent in area to it. When a microscope is used a graticule with a series of circles on it may be fitted into the eyepiece and when a projection microscope is used the circles may be on a transparent sheet. All the particles within a given area are measured and a sufficient number of areas included to enable a distribution curve to be drawn (at least 300 particles). Particles suspected of being slivers and shales shall also be measured and counted.

5.3 Determination of Impurities.—An accurately weighed sample of approximately 5 carats is first digested with 5 to 10 ml of hot bichromate cleaning solution. After the digestion is complete, the diamond powder is settled by centrifuging and the cleaning solution decanted. The powder is then washed with not less than five 10 ml portions of distilled water, centrifuged, and decanted between washings without loss of diamond powder. The final decanted portion of water should be colorless. This cleaning procedure will remove organic impurities such as oils, greases or lint.

The remaining sample is then digested at room temperature with 5 to 10 ml of 10-percent hydrochloric acid, settled, decanted, and washed, followed by digestion with 5 to 10 ml of 10-percent nitric acid, after which it is again settled and washed at least three times. The moist powder is then transferred to a clean platinum dish or crucible and 10 to 15 drops of diluted sulfuric acid (1-1) and 10 ml of hydrofluoric acid (40 percent) are added. Evaporate on a sand bath or hot plate to fumes of sulfuric acid. Care should be taken to avoid loss by spattering. Cool the dish, add a few drops of water, 5 ml of hydrofluoric acid (40 percent), and repeat the evaporation until all sulfuric acid has been expelled. Cover the dish, transfer to a desiccator, cool, and weigh. The percentage loss in weight of the sample represents the organic and inorganic impurities removed by the above procedure excepting sulphates such as calcium or barium sulphate or other materials insoluble in the above acids or water, including traces of substances highly resistant to acids.

If it is suspected that such contaminants may still be present, the weighed acid cleaned sample shall then be treated by a combustion method; it shall be burnt in oxygen generally in accordance with accepted methods of determining carbon in steel. For this purpose the sample is placed on a porcelain boat and after burning in a stream of oxygen the carbon dioxide absorbed in a suitable alkaline absorber is weighed and from it the remaining impurities are calculated. (The ash remaining on the porcelain boat may be weighed to check the result obtained by the combustion. Consideration should be made for slight differences in the results of carbon analysis between the two methods.)

6. IDENTIFICATION

6.1 Preferred method.—In order to assure the purchaser that he is getting diamond powder which meets all of the requirements of the standard, it is recommended that manufacturers declare compliance with this Standard by means of the following statement on labels, invoices, sales literature, etc., in conjunction with their name or trademark:

This diamond powder is in conformance with all requirements of Commercial Standard CS261-63 as developed by the trade under the procedure of the Office of Commodity Standards, National Bureau of Standards, United States Department of Commerce.

Particle size -----

Name or Trademark of Manufacturer

6.2 Alternate method.—Where space is limited, the following will suffice:

CS261-63

Particle size -----

Name or Trademark of Manufacturer

6.3 Exceptions.—Diamond powders of nonstandard or intermediate size range but otherwise in full compliance with the requirements of the standard, may use a label essentially like the following:

Sample Label

Nominal particle size range 20 to 30 microns
Maximum oversize particle 33 microns

This diamond powder is, except for the actual values shown above, in conformance with all requirements of Commercial Standard CS261-63 as developed by the trade under the procedure of the Office of Commodity Standards, United States Department of Commerce.

Name or Trademark of Manufacturer

HISTORY OF PROJECT

In a letter dated November 8, 1960, the Industrial Diamond Association of America, Inc., requested the cooperation of the Commodity Standards Division, Office of Technical Services (now Office of Com-

modity Standards, National Bureau of Standards) in the establishment of a Commercial Standard for Grading of Diamond Powder in Sub-Sieve Sizes. The IDA requested that the new standard supersede that portion of CS123-49 which applied to sub-sieve sizes, and a new Standing Committee was appointed. After the IDA draft was edited by the Division, it was reviewed for technical adequacy and accuracy by the National Bureau of Standards. Major adjustments were suggested in the testing procedure, and the revised draft was submitted to the new Standing Committee for consideration on May 3, 1962. Many suggestions were received and were resolved by the IDA. A Recommended Commercial Standard, TS-5633, was widely circulated to the trade on June 17, 1963, for final approval. According to the IDA, the manufacturers who accepted the standard produce over 85 percent of this commodity. Therefore, in the absence of valid objections, the new standard CS261-63, was announced on August 20, 1963, to become effective for new production on September 20, 1963.

Project Manager: Wm. H. Furcolow, Office of Commodity Standards, National Bureau of Standards, U.S. Department of Commerce.

Technical Adviser: Richard K. Kirby, Metrology Division, National Bureau of Standards, U.S. Department of Commerce.

STANDING COMMITTEE

The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Office of Commodity Standards, U.S. Department of Commerce which acts as Secretary for the committee.

Representing Manufacturers

Mr. Charles Baumgold, Pres., Diamond Tool Research Co., Inc., 580 Fifth Ave., New York 36, N.Y.

Mr. E. L. Kapernaros, Metallurgical Products Dept., General Electric Co., Box 237, R.P.A., Detroit 32, Mich.

Mr. O. Edward Olivieri, J. K. Smit & Sons, Inc., 571 Central Ave., Murray Hill, N.J.

Representing Distributors

Dr. Michael Seal, Industrial Diamond Division, Engelhard-Hanovia, Inc., 497 Delancy St., Newark 5, N.J.

Mr. Nathan Salzman, General Diamond Co., 576 Fifth Ave., New York 36, N.Y.

Mr. John Van Itallie, Pres., The Van Itallie Corp., 70 West 40th St., New York 18, N.Y.

Mr. Michael Werdiger, Pres., Michael Werdiger, Inc., 2 West 46th St., New York 36, N.Y.

Mr. Harry L. Strauss, Jr., Pres., National Diamond Laboratory, Inc., 619 South St., Peekskill, N.Y.

Mr. Bernard F. Veyra, Leon Tempelsman & Son, 529 Fifth Ave., New York 17, N.Y.

Representing Users

Mr. Eric J. Schneider, Engis Equipment Co., 431 South Dearborn St., Chicago 5, Ill. (Chairman).
 Mr. R. P. Hight, Chief, Microscopic Unit, Norton Co., Worcester 6, Mass.
 Mr. Edward W. Weimar, Jr., Wheel Trueing Tool Co. of N.J., 33 West St., Bloomfield, N.J.
 Mr. J. Wizlarde, Precision Products Division, Elgin National Watch Co., National and Grove Sts., Elgin, Ill.
 Mr. Leonard A. Zucker, Union Wire Die Corp., 71 West 45th St., New York 36, N.Y.
 Mr. George C. Pompeo, American Optical Co., 14 Mechanic St., Southbridge, Mass.
 Mr. L. H. Metzger, Pres., Super-Cut Distributors, Inc., 3418 North Knox Ave., Chicago 41, Ill. (Representing the Industrial Diamond Association of America, Inc.)

ACCEPTORS

The manufacturers, distributors, users and others listed below have individually indicated in writing their acceptance of this Commercial Standard prior to its publication. The acceptances indicate an intention to utilize the Standard as far as practicable, but reserve the right to depart from it as may be deemed desirable. The list is published to show the extent of recorded public support for the Standard, and should not be construed as indicating that all products made by the acceptors actually comply with its requirements.

Products that meet all requirements of the standard may be identified as such by a certificate, grade mark, or label. Purchasers are encouraged to require such specific representation of compliance, which may be given by the manufacturer whether or not he is listed as an acceptor.

ASSOCIATIONS

(General Support)

American Society for Abrasives, Cleveland, Ohio
 Grinding Wheel Institute—Abrasive Grain Association, Cleveland, Ohio
 Industrial Diamond Association of America, Inc., Pompton Plains, N.J.

FIRMS AND OTHER INTERESTS

A.I.T. Diamond Tool Co., Skokie, Ill.
 Acme Scientific Co., Chicago, Ill.
 Acroscope Engineering, Inc., Los Angeles, Calif.
 Action Diamond Tool Co., Chicago, Ill.
 Alpex Wheel Co., Teaneck, N.J.
 American Coldset Corp., Teterboro, N.J.
 American Diamond Tool & Gauge Co., Detroit, Mich.
 American Optical Co., Southbridge, Mass.
 American Steel and Wire Division, United States Steel Corp., Cleveland, Ohio.
 Amplex Corp., Bloomfield, Conn.

Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N.J.

Bay State Abrasive Products Co., Westboro, Mass.
 Bulova Watch Co., Woodside, N.Y.

Camden Wire Co., Inc., Camden, N.Y.
 Carbide Products Co., Huntington Park, Calif.
 Carborundum Co., Niagara Falls, N.Y.
 Cardinal Engineering Corp., Philadelphia, Pa.
 Cleveland Industrial Tool Corp., Char-don, Ohio
 Clipper Diamond Tool Co., Inc., New York, N.Y.
 Corundum Co., Inc., Willoughby, Ohio
 Crafts, Arthur A., Co., Inc., Waltham, Mass.
 Cutwell Diamond Products, Inc., Saddle Brook, N.J.

Dessau, Maurice S., Co., Inc., New York, N.Y.
 Diacraft, Inc., Detroit, Mich.
 Diamond Distributors, Inc., New York, N.Y.
 Diamond Drill Carbon Co., New York, N.Y.
 Diamond Dust Co., Inc., Mineola, L.I., N.Y.
 Diamond Grading, Inc., Elgin, Ill.

Diamond Tool Research Co., Inc., Wholesale Division, New York, N.Y.
 Diamond Tool Research Co., Inc., Manufacturing Division, New York, N.Y.
 DoALL Co., Des Plaines, Ill.
 Driver, Wilbur B., Co., Newark, N.J.
 Dubbeldee Diamond Corp., New York, N.Y.

Elgin National Watch Co., Precision Products Division, Elgin, Ill.
 Engelhard Hanovia, Inc., Industrial Diamond Division, Newark, N.J.

Fish-Schurman Corp., New Rochelle, N.Y.
 Florida, University of, Metallurgy Research Laboratory, Gainesville, Fla.
 Freed Industrial Diamond Corp., New York, N.Y.

Galaxie Diamond Products, Hatboro, Pa.
 General Diamond Co., New York, N.Y.
 Golconda Corp., Chicago, Ill.
 Golconda Sales Corp., Chicago, Ill.
 Greenlee Diamond Tool Co., Chicago, Ill.

Hamilton Watch Co., Lancaster, Pa.
 Hoffman Brothers Drilling Co., Punxsutawney, Pa.
 Hoskins Manufacturing Co., Detroit, Mich.
 Hudson Wire Co., Ossining, N.Y.
 Hyprez Division, Engis Equipment Co., Chicago, Ill.

Indiana Wire Die Co., Fort Wayne, Ind.
 Industrial Diamond Co., Ferndale, Mich.

Johnson Steel & Wire Co., Inc., Worcester, Mass.

Kluyskens, Gerard, Co., New York, N.Y.
 Koebel Diamond Tool Co., Detroit, Mich.

Metallurgical Products Dept., General Electric Co., Detroit, Mich.
 Meyers, W. F., Co., Bedford, Ind.
 Montgomery, T. W., Co., Hatboro, Pa.

National Diamond Laboratory, Inc., Peekskill, N.Y.
 National Diochemical Co., Chicago, Ill.
 National Research Co., Roseville, Mich.
 Nesen Diamond Tool Corp., Tuckahoe, N.Y.

Neuber Industrial Diamond Co., Brighton, Mass.
 Newark Wire Cloth Co., Newark, N.J.
 North American Diamond Trading Corp., New York, N.Y.
 Norton Co., Worcester, Mass.

Parsons Diamond Products, Inc., West Hartford, Conn.
 Patzig Testing Laboratories, Inc., Des Moines, Iowa
 Penn Scientific Products Co., Abington, Pa.
 Permattach Diamond Tool Corp., Milford, N.H.
 Precision Carbide Co., Paterson, N.J.
 Precision Diamond Tool Co., Elgin, Ill.

Rough Diamond Co., Inc., New York, N.Y.
 Rusch Wire Die Corp., Croton-on-Hudson, N.Y.

Schuller, Jack V., Inc., Park Ridge, Ill.
 Simonds Abrasive Co., Philadelphia, Pa.
 Slesinger, Charles, Inc., New York, N.Y.
 Smit, Anton & Co., Inc., New York, N.Y.
 Smit, J. K., & Sons, Inc., Murray Hill, N.J.

Super-cut, Inc., Chicago, Ill.
 Super-cut Distributors, Inc., Chicago, Ill.
 Super-cut Sales, Inc., Chicago, Ill.

Tempelsman, Leon, & Son, New York, N.Y.
 Titmus Optical Co., Petersburg, Va.

Union Wire Die Corp., Long Island City, N.Y.

Van Itallie Co., Inc., New York, N.Y.

Warren Diamond Powder Co., College Point, N.Y.
 Werdiger, Michael, Inc., New York, N.Y.
 Williams, Bruce, Laboratories, Joplin, Mo.

U.S. GOVERNMENT

General Services Administration, Washington, D.C.
 Health, Education, and Welfare, Department of, Washington, D.C.
 Interior, Department of, Washington, D.C.
 Veterans Administration, Washington, D.C.

TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial Standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of Commercial Standards is to establish, for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the standard, where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function, performed by the Department of Commerce in the voluntary establishment of Commercial Standards on a nationwide basis is fourfold: First, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or of the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.